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Type of the Paper: Case Report.
Type of Review: Peer Reviewed.
Indexed In: OpenAIRE.
DOI: http://doi.org/10.5281/zenodo.2586237.
Google Scholar Citation: **IJHSP**

How to Cite this Paper:
Praveen, N. M., Manasa, S. Muchadi, Kiran B., & Sathish Kumar, B. Y. (2019). Isolation, Characterization and Physicochemical Properties of Starch from Ginger (Zingiber Officinale). *International Journal of Health Sciences and Pharmacy (IJHSP)*, *3*(1), 13-17.
DOI: http://doi.org/10.5281/zenodo.2586237.

International Journal of Health Sciences and Pharmacy (IJHSP)
A Refereed International Journal of Srinivas University, India.

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ABSTRACT

Ginger (Zingiber officinale) contains constituent like starch, fat, gingerol, volatile oil, the crushed ginger root and starch extracted based on properties of physicochemical that isolates using 1 % w/v sodium metabisulphite solution of achieving starch was initiate to be crystalline, non-hygroscopic powder with 1.3 swelling powder capacity, 37% of solubility capacity and gelatinization temperature at 80^0C. The character study of starch was extracted and showed physicochemical properties elevate using extraction, purification, concentration, physical or biological process expressed for identification of sinking and non-reducing carbohydrates.

Keywords: Zingiber officinale, Physicochemical, Reducing Substance, Antioxidant.

1. INTRODUCTION :

Ginger *(Zingiber officinale)* is a herbaceous persistent plant of the family Zingiberaceae, which is used worldwide in cooking and traditional medicine with exceptional acidity and typical aroma. The increased consumption of food supplements is recognized as a non-pharmacological treatment. It is commonly used for the treatment of stomachache, arthritis, and nausea. Starch is solitary prolific organic chemicals that synthesize amyloplasts of seeds, grains, roots, and leaves of green plants in the plasmids that serve as an elementary storage form of energy from the sun. Starch recognized as biodegradable and biopolymer of the digestible polysaccharide of renowned nutritional superior to a low molecular weight of carbohydrate or sugar [1].
The World Health Organization (WHO), traditional plants are used as a complementary medicine used in pharmaceutical products coupled with desire traditional medicine used for quality and traceability of botanical element in food enhancement [2-3]. Ginger has antibacterial resistance used for traditional medicine of Zingiberaceae family that strengthen gastrointestinal (GI) disorder such as dyspepsia, to cure upper intestine ulcers include gastritis and peptic ulcer disease (PUD) caused due to bacterial infection (BI) [4-5].
The carbohydrates consist of large glucose units of polysaccharides which can produce using green plants as an energy store. The purest form of starch viewed as white, unsavory and unscented powders which are inexplicable in cold water or alcohol. Ginger component act as tough antioxidants and valuable antimicrobial agents used primary sources gastritis and peptic ulcer in the gram-negative bacterium [6-7]. Ginger inhibits numerous pro-inflammatory cytokines includes Interleukine-1 (IL-1), Tumor necrosis factor alpha (TNF-α) and Interleukine-8 (IL-8) with hamper prostaglandin (PG) and leukotriene (LT) synthesis enzymes, they expressed with gene encoding cytokines. They are conventional non-steroidal anti-inflammatory drugs (NSAIDs) [8].
The present study observed physicochemical and functional properties of ginger form extracted starch that can elevate using extraction, purification, concentration, physical or biological process expressed for identification of reducing and non reducing carbohydrates.

2. MATERIALS AND METHODS :

2.1 Materials

The fresh sample of Ginger root was collected

from the local area of Mysuru district, Karnataka. The samples were cleaned and packed in a sealed container at room temperature until needed.

2.2 Purification and Isolation of Starch from Ginger (Zingiber Officinale)

The fresh 2kg of ginger roots were brought peeled and washed,the sample before chopped into tiny pieces and soaked in 1% of sodium metabisulphite solution in 1 liters of distilled water at room temperature at 25^0 C. Thereafter, a scrap of root were impassive and drench pulverized aninto slurry using a grater. The paste was discrete througha hugeamount of 1% sodium metabisulphiteis filtered in muslin cloth. The deferment was centrifuged at 3500rpm for 10 minutes to assist for the exclusion of dirty, the supernatant was carefully decanted and the mucilage scraped off, repeatfour times with the mucilage on the starch tatteredconstantlyin anticipation of a pure starch was obtained. The starch was auxiliary dried at 60^0C in a hot air oven, minced, evaluate and stored in a sample bottle for analysis [9].

2.3 Determination of Swelling Power

Starch sample (0.1gm) was evaluated in a test tube and 10 ml of distilled water was added. The mixture was heated in water bath at a room temperature of 50^0C for 30 minutes with uninterrupted shaking. The test tube was centrifuged at 1500rpm for 20 minutes in order to facilitate the removal of the supernatant which was carefully decanted and the weight of the starch paste taken. The swelling power was calculated as follows:

$$\text{Swelling Power} = \frac{\text{Weight of Starch Paste}}{\text{Weight of Dry Starch Sample}}$$

This was carried out over a temperature range of 50^0C.

Determination of Solubility Power

Solubility index was determined over a temperature range of 50^0C as follow: starch sample (0.5gm) was added to 10 ml distilled water in a test tube. This was subjected to heating in a water bath with a starting temperature of 50^0C for 30 minutes. Thereafter, it was centrifuged at 1500 rpm for 30 minutes. 5 ml of the supernatant was decanted and dried to constant weight. The solubility was expressed as the percentage (%) by weight of dissolved starch from heated solution.

$$\% \text{ Solubility} = \frac{\text{Weight of the Starch Paste}}{\text{Weight of sample of Dry basis}} \times 100$$

pH

A 20 % w/v dispersion of the sample was shaken in water for 5 minutes and the pH was determined using pH meter.

2.4 Gelatinization Temperature

This was evaluated using the starch sample (0.5 gm) was put in a 20 ml beaker and 5 ml of distilled water added. The dispersion was heated on a hot plate. The gelatinization temperature was then read with a thermometer suspended in starch slurry [10].

2.5 Foam Capacity

Sample (1 gm) was homogenized in 50 ml distilled water using vortex mixer for 5 minutes. The homogenate was poured into a 100 ml measuring cylinder and the volume recorded after 30 seconds. The foam capacity was expressed as the percent increase in volume.

$$\text{Foam Calculation} = \frac{\text{Average change in Volume}}{\text{Initial Volume}} \times 100$$

Test for Carbohydrates

Molish's Test

Take 2 ml of ginger extract solution was treated with few drops of Molish's reagent in a test tube and 2 ml of conc.$H_2SO_4$was added carefully along the side of tubes the formation of reddish violet ring at the junction of two layers indicates the presence of carbohydrates.

Test for Reducing Sugar

Benedict's test

Take 2 ml of benedict's reagent in a clean test tube add 1 ml of extract was added, warmed and allowed to stand for 2 min, that gets red precipitate indicates the presence of sugar.

Fehling's Test

Mix the equal volume of (5 ml) extract solution and same volume of fehlings solution (equal mixture of fehlings solution A and B) and boil it. After few minute the appearance of brick red precipitate, it indicates the presence of reducing sugar.

Test for Monosaccharides

Barfoed's Test

In a clean test add equal volume of extract and barfoeds reagent test solution. Allow it toheat for 1-2 minutes in a water bath and cool. The existence of red precipitate indicates the presence of monosaccharide.

Test for Hexose Sugar

Selwinoff's Test

Take a clean test tube add 3 ml Selwinoff's reagent gently heat it later add 1 ml test solution in bearing water bath for 1-2 minutes. Observe red color formation.

Test for Non-Reducing Sugars

Benedicts Test

Take 2 ml of Benedict's reagent and 1 ml of extract was added, allow for warming for few minutes in stand; formation of red precipitate indicates the presence of sugar.

Test for Non-Reducing Polysaccharides

Iodine Test

Mix 3 ml test solution and add few drops of dilute iodine solution. Blue color appears; it disappears on boiling and reappears on cooling [11].

3. RESULTS :

From the above identification of preliminary screening tests shows the presence of carbohydrates are extracted from the starch of zinger.

Table 1 : Physicochemical Properties of Ginger Starch

Physicochemical Properties of Ginger Starch	
Parameters	**Ginger**
pH	6.2 ± 0.2
Gelatinization Temperature (^{0}C)	80 ± 0.02
Foam Capacity (%)	4 ± 0.1
Swelling Capacity	1.3
Solubility Capacity	37%

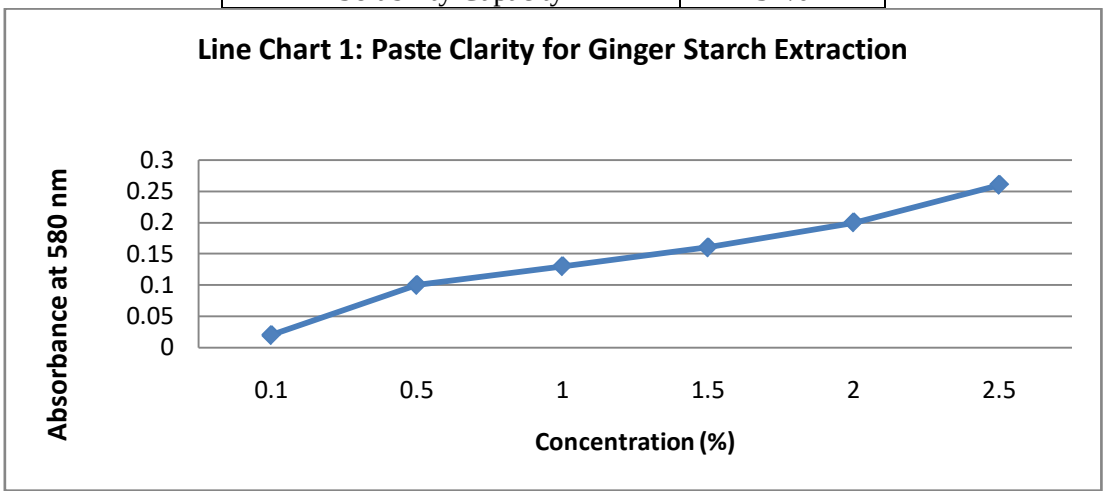

Fig 1 : : Paste Clarity for Ginger Starch Extraction

Table 2 : Screening of extract Rhizome of Ginger using Photochemical Methods

S.No	Chemical Test	Remark
01.	Test for Carbohydrates a) Molishs Test b) Fehling Test c) Benedicts Test	 Positive Negative Negative
02.	Test for Monosaccharide a) Barfoed's Test	 Negative
03.	Test for Hexose Sugar a) Selwinoff's Sugar	 Positive
04.	Test for Non-Reducing Sugar a) Benedicts Test	 Negative
05.	Test for Non-Reducing Polysaccharides a) Iodine Test	 Positive

4. CONCLUSION :

The present study the starch was extracted from Zingerofficinale by using centrifugation, physicochemical properties of ginger starch was found to be white, tasteless, the swelling and solubility profile, water holding capacity, paste clarity, foam capacity, pH, and gelatinization temperature of ginger starch was found. There starch indicates the presence of carbohydrates.

Abbreviation

World Health Organization (WHO), Peptic Ulcer Disease (PUD), Gastrointestinal (GI), Bacterial Infection (BI), Interleukin (IL), Tumor Necrosis Factor Alpha (TNF-α), Prostaglandin (PG), Leukotriene (LT), Non-Steroidal Anti-Inflammatory Drugs (NSAID).

Consent for publication

The authors declare that this article is original, has never been published, and has not been submitted to any other journal.

Ethics approval and consent to participate

Not applicable

Authors' contribution

PNM, MS and KBM wrote the manuscript, SKBY edited and finalized the manuscript. All authors read and approved the final manuscript.

Competing interests

The authors declare that they have no competing interest.

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